

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
NEW PROVISIONAL PATENT APPLICATION**

**TITLE:** DIGITAL IMAGE CAPTURING MODULE ASSEMBLY AND METHOD OF  
FABRICATING THE SAME

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**FILING DATE:** July 10, 2003

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## DIGITAL IMAGE CAPTURING MODULE ASSEMBLY AND METHOD OF FABRICATING THE SAME

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention:

5        This invention relates to electronics assembly technology, and more particularly, to a digital image capturing module assembly and method of fabricating the same, which is designed for use to assemble a digital image capturing module by mounting an optical sensing PCB (printed circuit board), such as CCD (Charge Coupled Device) or CMOS (Complementary Metal Oxide Semiconductor) based PCB, to a lens holder.

#### 10    2. Description of Related Art:

      Digital image capturing module is a key component in the assembly of a digital still camera (DSC) or a camera-equipped electronic device such as mobile phone, which is composed of a lens holder and a sheet-shaped photosensitive printed circuit board (PCB); wherein the lens holder is used to hold a lens unit that is used to capture an optical image  
15    and focus the captured image on a focusing plane on the rear of the lens holder, while the photosensitive printed circuit board is, for example, CCD (Charge Coupled Device) or CMOS (Complementary Metal Oxide Semiconductor) based, and which is arranged on the focusing plane of the lens holder for the purpose of converting the optical image focused thereon into digital form.

20        A conventional method for the assembly of a digital image capturing module is to provide an array of aligning posts on the periphery of the focusing plane on the lens holder and a corresponding array of aligning holes in the photosensitive printed circuit board to

help align the photosensitive printed circuit board in position on the lens holder. Further, the photosensitive printed circuit board is securely fixed in position by melting the tips of the aligning posts in addition to the use of an adhesive layer to adhere the photosensitive printed circuit board to the lens holder.

5           One drawback to the foregoing assembly method, however, is that the provision of the aligning posts would undesirably make the finished product quite large in volume, i.e., the overall length of the finished digital image capturing module would be equal to the length of the lens holder plus the thickness of the photosensitive printed circuit board, and therefore there is still room for improvement in compactness. In addition, it would often be  
10   difficult to coat the adhesive agent evenly over the lens holder, particularly at the corners where the aligning posts are located, undesirably resulting in the formation of leakage holes in the coated adhesive layer. These leakage holes would adversely cause the captured image by the digital image capturing module to be subjected to sidelight effect and thus degrade the optical quality of the captured image.

## 15                               SUMMARY OF THE INVENTION

It is therefore an objective of this invention to provide a new digital image capturing module assembly and method of fabricating the same which can help allow the finished digital image capturing module to be more compact in size than prior art.

It is another objective of this invention to provide a digital image capturing module  
20   assembly and method of fabricating the same which allows the junction between the photosensitive printed circuit board and the lens holder to have a sealed light-impenetrable

quality, so that the captured image by the digital image capturing module would be free of sidelight effect and thus ensured in its optical quality.

The digital image capturing module assembly and method of fabricating the same according to the invention is designed for use to assemble a digital image capturing module  
5 by mounting an optical sensing PCB (printed circuit board), such as CCD (Charge Coupled Device) or CMOS (Complementary Metal Oxide Semiconductor) based PCB, to a lens holder.

The digital image capturing module assembly and method of fabricating the same according to the invention is characterized by the provision of a shouldered portion and a  
10 grooved portion in the lens holder's inner wall around the focusing plane of the lens holder wherein an adhesive layer is coated in the grooved portion to adhere the photosensitive printed circuit board to the lens holder.

The digital camera lens module assembly and method of fabricating the same according to the invention is advantageous to use in that it allows the junction between the  
15 photosensitive printed circuit board and the lens holder to have a sealed light-impenetrable quality, so that the captured image by the digital image capturing module of the invention would be substantially free of sidelight effect that would otherwise degrade the optical quality of the captured image. Moreover, it allows the overall length of the finished digital image capturing module to be the same as the length of the lens holder, allowing the  
20 finished digital image capturing module to be more compact in size than prior art.

## BRIEF DESCRIPTION OF DRAWINGS

The invention can be more fully understood by reading the following detailed description of the preferred embodiments, with reference made to the accompanying drawings, wherein:

5        FIG. 1 is a schematic diagram showing an exploded perspective view of the various constituent parts used to assemble a digital image capturing module according to the invention;

FIG. 2 is a schematic diagram showing a sectional view of that shown in FIG. 1;

10       FIG. 3 is a schematic sectional diagram used to depict an adhesive agent dispensing procedure used in the assembly of the digital image capturing module according to the invention;

FIG. 4 is a schematic diagram showing a sectional view of the finished product of the digital image capturing module according to the invention; and

15       FIG. 5 is a schematic diagram showing a perspective view of the finished product of the digital image capturing module according to the invention.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The digital image capturing module assembly and method of fabricating the same according to the invention is disclosed in full details by way of preferred embodiments in the following with reference to the accompanying drawings.

20       Referring first to FIG. 1 together with FIG. 2, the first step in the assembly of a digital image capturing module according to the invention is to prepare a lens holder 10 and a sheet-shaped photosensitive printed circuit board 20.

The lens holder 10 has an inside hollowed portion 11 for the accommodation of a lens unit (not shown) therein, and the lens unit is to be used to capture an optimal image and focus the captured image on a focusing plane 12 on the rear side of the lens holder 10. The invention is characterized in that the lens holder 10 is formed with a shouldered portion 14 on the lens holder's inner wall 13 on the periphery of the focusing plane 12 and is further formed with a grooved portion 15 in shouldered portion 14. Preferably, the space confined within the lens holder's inner wall 13 over the shouldered portion 14 is dimensioned to be substantially equal to the area of the photosensitive printed circuit board 20, and the shouldered portion 14 is dimensioned to a depth substantially equal to the thickness of the photosensitive printed circuit board 20.

The photosensitive printed circuit board 20 can be, for example, a CCD (Charge Coupled Device) based or a CMOS (Complementary Metal Oxide Semiconductor) based circuit board, and which is to be used to convert the optical image captured by the lens unit (not shown) in the lens holder 10 into digital form. Preferably, the photosensitive printed circuit board 20 is dimensioned in such a manner that its area is equal to the space confined within the lens holder's inner wall 13 over the shouldered portion 14, and its thickness is equal to the depth of the shouldered portion 14 of the lens holder 10.

Referring next to FIG. 3, during the assembly process, the first step is to perform an adhesive agent dispensing process to dispense an adhesive agent into the grooved portion 15 in the shouldered portion 14 of the lens holder 10 to form an adhesive layer 30.

Referring further to FIG. 4, in the subsequent step, the photosensitive printed circuit board 20 is fitted into the space confined within the lens holder's inner wall 13 over the shouldered portion 14 so as to be embedded therein, and meanwhile the photosensitive

printed circuit board 20 is adhered by means of the adhesive layer 30 to the lens holder 10 so as to be fixedly mounted on the lens holder 10. During this procedure, since the photosensitive printed circuit board 20 is dimensioned to be equal to the space confined within the lens holder's inner wall 13 over the shouldered portion 14, the photosensitive  
5 printed circuit board 20 can be aligned in position with the help of the lens holder's inner wall 13. In addition, since the photosensitive printed circuit board 20 is embedded to a depth within the lens holder's inner wall 13 and adhered by the adhesive layer 30 coated in the grooved portion 15 which is also positioned at a depth within the lens holder's inner wall 13, it can help provide a sealed light-impenetrable effect at the junction between the  
10 photosensitive printed circuit board 20 and the lens holder 10. Furthermore, since the thickness of the photosensitive printed circuit board 20 is substantially equal to the depth of the shouldered portion 14 of the lens holder 10, the entirety of the photosensitive printed circuit board 20 can be fully embedded within the lens holder's inner wall 13, allowing the overall length of the finished digital image capturing module to be exactly the same as the  
15 length of the lens holder 10, which makes the finished digital image capturing module more compact in size than prior art.

FIG. 5 shows a perspective view of the finished product of the digital image capturing module according to the invention. In application, since the junction between the photosensitive printed circuit board 20 and the lens holder 10 has a sealed light-  
20 impenetrable quality, the captured image by the digital image capturing module of the invention would be substantially free of sidelight effect that would otherwise degrade the optical quality of the captured image.



In conclusion, the invention provides a digital image capturing module assembly and method of fabricating the same for use to assemble a digital image capturing module by mounting a photosensitive printed circuit board to a lens holder, which is characterized by the provision of a shouldered portion and a grooved portion in the lens holder's inner wall  
5 around the focusing plane of the lens holder wherein an adhesive layer is coated in the grooved portion to adhere the photosensitive printed circuit board to the lens holder. This feature allows the junction between the photosensitive printed circuit board and the lens holder to have a sealed light-impenetrable quality, so that the captured image by the digital image capturing module of the invention would be substantially free of sidelight effect that  
10 would otherwise degrade the optical quality of the captured image. Moreover, it allows the overall length of the finished digital image capturing module to be the same as the length of the lens holder, allowing the finished digital image capturing module to be more compact in size than prior art. The invention is therefore more advantageous to use than the prior art.

The invention has been described using exemplary preferred embodiments.  
15 However, it is to be understood that the scope of the invention is not limited to the disclosed embodiments. On the contrary, it is intended to cover various modifications and similar arrangements. The scope of the claims, therefore, should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.